



Endoprosthetic Replacement in the Surgical Treatment of Sarcoma Patients

**An audit of EPR surgery
recorded in HES data
compared with a specialist
sarcoma centre database
(2000 – 2009)**

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1.0 INTRODUCTION

There is currently much interest in bone sarcoma patients treated surgically with an endoprosthetic replacement (EPR), with particular focus on 30-day readmissions with complications, and the risk of developing a second primary cancer caused by the EPR¹ or the other treatment provided to the patient. This report aims to evaluate the accuracy and completeness of the recording of EPR related episodes in the hospital episode statistics (HES) dataset compared with the database held by a large orthopaedic specialist centre, and to investigate whether the details of all sarcoma patients treated within the specialist centre were submitted to the appropriate cancer registry.

2.0 METHODS

The West Midlands Cancer Intelligence Unit (WMCIU) is the English lead registry for bone and soft tissue sarcomas. The lead registry analyses data on the incidence, mortality, survival and treatment of bone and soft tissue sarcomas in England. These analyses are usually conducted using the National Cancer Data Repository (NCDR) and HES datasets. The NCDR is a compilation of the eight cancer registry datasets which cover all tumours diagnosed in England.

The HES dataset is a national dataset which records the details of all inpatient and day case admissions including patient demographics, the hospital of admission, the conditions observed and diagnosed and details of all procedures carried out on the patients. HES data are compiled from data submitted by NHS and do not include patients treated privately. There are three main HES datasets: inpatient, outpatient and accident and emergency.

The Royal Orthopaedic Hospital NHS Foundation Trust (ROH) is one of the largest orthopaedic units in Europe, and the largest unit in the world for the treatment of bone and soft tissue sarcomas. All inpatient surgical treatment, including EPRs, undertaken within the ROH should be recorded within the HES dataset. In addition, the details of all patients, who normally reside in England and who were referred to the ROH for treatment, should be present within the NCDR with a corresponding bone or soft tissue sarcoma registration.

The local patient identifier recorded within the HES dataset is a unique identifier for a patient in relation a particular hospital. A patient can have many different local patient identifiers recorded in HES depending on the number of hospitals into which they have been admitted. Patients in the ROH and HES datasets were matched using the local patient identifier ("iopatid") field. For each patient identified within the HES dataset, each of the operation fields recorded which related to EPRs were identified.

The treatment and patient details recorded within the ROH database and the HES dataset were then compared to the NCDR to determine whether a corresponding bone or soft tissue sarcoma entry was present for each patient. Because the ROH treats patients with bone and soft tissue sarcoma from all over the world, not all of the patients treated within the ROH were expected to be present within the NCDR as the latter only includes patients normally resident in England.

The dataset provided by the ROH consisted of 1,525 patients treated surgically with an EPR between 1970 and 2012. The HES dataset covers inpatient and day case admissions between 1998 and 2010, and the NCDR contains the details for all patients diagnosed with cancer in England between 1985 and 2009. The ROH dataset was modified to include patients normally resident in England and where the EPR was undertaken between 2000 and 2009. This allows an analysis of ten years worth of data allowing a greater accuracy of matching between the ROH and registry datasets. This reduced the ROH dataset to 514 patients (see Appendix for OPCS4 codes relating to EPRs).

¹ Smith, A. J., Dieppe, P., Porter, M., and Blom, A. W., 2012. Risk of cancer in first seven years after metal-on-metal hip replacement compared with other bearings and general population: linkage study between the National Joint Registry of England and Wales and hospital episode statistics. *British Medical Journal*, 344, e2383

3.0 RESULTS

3.1 Identifying ROH Patients Within HES

Of the 514 patients treated at the ROH between 2000 and 2009, 512 could be located within the HES dataset. Of the 2 patients who could not be located using either 'lopatid' or NHS number, 1 was later identified as a patient with an overseas address, and the other has no record within either the NCDR or HES datasets. The details for this patient were obtained from the ROH and relate to a patient previously treated at the Royal National Orthopaedic Hospital NHS Foundation Trust, who was referred to the ROH for a "loosening of prosthesis". Pathological information has been requested for this patient so that a cancer registration can be made.

Table 1: Patients treated at the ROH between 2000 and 2009: cancer registry of residence

Cancer Registry of Residence	HES STATUS		
	ROH Patient Details Located	No HES Record Located	Grand Total
Eastern Cancer Registration & Information Centre			16
North West Cancer Intelligence Service			92
Norther & Yorkshire Cancer Registration & Information Service		2*	68
South West Cancer Intelligence Service			46
Thames Cancer Registry			1
Oxford Cancer Registry			7
Trent Cancer Registry			88
West Midlands Cancer Intelligence Unit			99
Overseas Postcode		1	26
Scotland & Northern Ireland			12
Welsh Cancer Intelligence & Surveillance Unit			59
Grand Total		3	514

*1 patient was later found in HES by searching on NHS number

3.2 Identifying ROH Surgical Treatments in HES

A HES episode relating to an EPR could be found for 502 of the 512 patients recorded with an EPR at the ROH; 496 of the HES treatment dates were within 30 days of the treatment date recorded in the ROH dataset; 6 were recorded more than a month prior to or after the date recorded in the ROH (range 32 to 1798). These records are to be checked with the ROH.

Of the 514 patients treated surgically at the ROH between 2000 and 2009 for an EPR, 18 required further investigation to see if an operation date closer to the date recorded within the ROH database could be found in the HES database. A HES record could be found for 9 patients where the admission dates were within 1 day of the date recorded in the ROH dataset, but where the HES operation code recorded related to the "revision of EPR", rather than the initial fixation. The OPCS4 list of OPCS4 codes initially utilised to identify EPR related hospital episodes was therefore further adjusted to incorporate procedures relating to "revision of EPR", although the hospital of initial treatment could not be identified.

A HES record within one day of the date recorded within the ROH dataset could be allocated for another 5 patients, but the procedures did not relate to EPR. EPR related surgery could be found for these patients more than one year before or after the date recorded within the ROH dataset. A HES record relating to the implantation of a prosthetic device could be located within the HES dataset for a further 2 patients, but the date of procedure recorded in the ROH dataset and the HES dataset were almost one year apart. No EPR related HES record could be found for 2

patients. Further details for the 9 (2%) patients with conflicting ROH and HES records have been requested from the ROH.

3.3 Identifying ROH Patients and Tumours in the NCDR

Of the 514 patients with bone sarcoma treated at the ROH with an EPR, 417 were resident in England at the time of treatment. Of these, 398 (95.4%) could be located within the NCDR. The remaining 19 patients were investigated further:

- 5 were found within the NCDR with different patient demographics
- 5 were found within the West Midlands regional cancer database but were diagnosed in a different country so should not be included within the national data
- 4 were found on the West Midlands regional cancer database but the corresponding treatment details or pathology reports had not been submitted to the patient's cancer registry area of residence
- 3 were found on the NCDR with a different diagnosis – sarcoma not mentioned
- 2 patients could not be located within the NCDR.

Details for last 5 patients were investigated within the ROH database and hard copies of the treatment and case notes for the patients were sent to the WMCIU for further review.

- 1 was originally treated at the Royal National Orthopaedic Hospital NHS Foundation Trust (RNOH) and was admitted to the ROH to treat a broken prosthesis. This case should have been registered by the Thames Cancer Registry
- 1 was found on the NCDR with a correct diagnosis of haematological cancer
- 1 was registered with a cancer of the kidney, and it was unsure whether this was a correctly coded tumour, or whether it was metastases from the bone to the kidney. The details for this patient were sent to the appropriate cancer registry to allow an informed decision of how the tumour should be registered.
- 1 was previously diagnosed with a benign tumour, which was later confirmed as malignant (registration now made). The details for this patient were sent to the appropriate cancer registry to allow an informed decision of how the tumour should be registered.
- 1 patient did not have any diagnosis information on the NCDR although a registration has now been made from the information provided by the ROH to the WMCIU.
- A registration is yet to be made for one patient.

4.0 CONCLUSIONS

The results of this audit are very promising; a procedure corresponding to or relating to an admission for an EPR could be found for 505 out of 514 (98%) patients with bone or soft tissue sarcoma treated at the ROH between 2000 and 2009. A HES record could be allocated for another 7 patients although there were discrepancies between ROH and HES with regard to episodes relating specifically to an EPR admission. Thus, a corresponding HES record could be allocated for all but 2 patients treated at the ROH.

Pathological details for 407 (99%) of the 412 bone and soft tissue sarcomas treated at the ROH between 2000 and 2009 could be located within the NCDR. The pathology reports and case notes for the remaining 5 cases were submitted to the WMCIU for further review. As a result, 3 patients were identified in the NCDR with a correct non-sarcoma diagnosis, and a registration was made for 1 more.

These results demonstrate that the NCDR and HES datasets can be used reliably to analyse surgical treatment patterns for patients diagnosed with cancer and to provide an exceptionally useful resource for supporting commissioning services for cancer.

APPENDIX A – OPCS4 CODES RELATING TO EPR

OPCS4 code	Description
O251	Primary prosthetic replacement of head of radius not using cement
O258	Other specified prosthetic replacement of head of radius not using cement
O259	Unspecified prosthetic replacement of head of radius not using cement
O261	Primary prosthetic replacement of head of radius NEC
O268	Other specified other prosthetic replacement of head of radius
O269	Unspecified other prosthetic replacement of head of radius
O249	Unspecified prosthetic replacement of head of radius using cement
O248	Other specified prosthetic replacement of head of radius using cement
O241	Primary prosthetic replacement of head of radius using cement
O239	Unspecified total prosthetic replacement of elbow joint
O238	Other specified total prosthetic replacement of elbow joint
O231	Primary total prosthetic replacement of elbow joint NEC
O229	Unspecified total prosthetic replacement of elbow joint not using cement
O228	Other specified total prosthetic replacement of elbow joint not using cement
O221	Primary total prosthetic replacement of elbow joint not using cement
O219	Unspecified total prosthetic replacement of elbow joint using cement
O218	Other specified total prosthetic replacement of elbow joint using cement
O211	Primary total prosthetic replacement of elbow joint using cement
O189	Unspecified hybrid prosthetic replacement of knee joint using cement
O188	Other specified hybrid prosthetic replacement of knee joint using cement
O181	Primary hybrid prosthetic replacement of knee joint using cement
O089	Unspecified hybrid prosthetic replacement of shoulder joint using cement
O088	Other specified hybrid prosthetic replacement of shoulder joint using cement
O081	Primary hybrid prosthetic replacement of shoulder joint using cement NEC
O079	Unspecified hybrid prosthetic replacement of shoulder joint using cemented glenoid component
O078	Other specified hybrid prosthetic replacement of shoulder joint using cemented glenoid component
O071	Primary hybrid prosthetic replacement of shoulder joint using cemented glenoid component
O069	Unspecified hybrid prosthetic replacement of shoulder joint using cemented humeral component
O068	Other specified hybrid prosthetic replacement of shoulder joint using cemented humeral component
O061	Primary hybrid prosthetic replacement of shoulder joint using cemented humeral component
W051	Articulated prosthetic replacement of bone
W052	Implantation massive endoprosthesis replacement of bone
W441	Primary total prosthetic replacement of joint not using cement NEC
W448	Other specified total prosthetic replacement of other joint not using cement
W449	Unspecified total prosthetic replacement of other joint not using cement
W451	Primary total prosthetic replacement of joint NEC
W458	Other specified other total prosthetic replacement of other joint
W459	Unspecified other total prosthetic replacement of other joint
W461	Primary prosthetic replacement of head of femur using cement
W468	Other specified prosthetic replacement of head of femur using cement
W469	Unspecified prosthetic replacement of head of femur using cement
W471	Primary prosthetic replacement of head of femur not using cement
W478	Other specified prosthetic replacement of head of femur not using cement
W479	Unspecified prosthetic replacement of head of femur not using cement
W481	Primary prosthetic replacement of head of femur NEC
W488	Other specified other prosthetic replacement of head of femur
W489	Unspecified other prosthetic replacement of head of femur
W491	Primary prosthetic replacement of head of humerus using cement
W498	Other specified prosthetic replacement of head of humerus using cement
W499	Unspecified prosthetic replacement of head of humerus using cement

OPCS4 code	Description
W501	Primary prosthetic replacement of head of humerus not using cement
W508	Other specified prosthetic replacement of head of humerus not using cement
W509	Unspecified prosthetic replacement of head of humerus not using cement
W053	Implantation endoprosthesis replacement of bone NEC
W058	Other specified prosthetic replacement of bone
W059	Unspecified prosthetic replacement of bone
W371	Primary total prosthetic replacement of hip joint using cement
W378	Other specified total prosthetic replacement of hip joint using cement
W379	Unspecified total prosthetic replacement of hip joint using cement
W381	Primary total prosthetic replacement of hip joint not using cement
W388	Other specified total prosthetic replacement of hip joint not using cement
W389	Unspecified total prosthetic replacement of hip joint not using cement
W391	Primary total prosthetic replacement of hip joint NEC
W398	Other specified other total prosthetic replacement of hip joint
W399	Unspecified other total prosthetic replacement of hip joint
W401	Primary total prosthetic replacement of knee joint using cement
W408	Other specified total prosthetic replacement of knee joint using cement
W409	Unspecified total prosthetic replacement of knee joint using cement
W411	Primary total prosthetic replacement of knee joint not using cement
W418	Other specified total prosthetic replacement of knee joint not using cement
W439	Unspecified total prosthetic replacement of other joint using cement
W419	Unspecified total prosthetic replacement of knee joint not using cement
W421	Primary total prosthetic replacement of knee joint NEC
W428	Other specified other total prosthetic replacement of knee joint
W429	Unspecified other total prosthetic replacement of knee joint
W431	Primary total prosthetic replacement of joint using cement NEC
W438	Other specified total prosthetic replacement of other joint using cement
W951	Primary hybrid prosthetic replacement of hip joint using cement NEC
W511	Primary prosthetic replacement of head of humerus NEC
W518	Other specified other prosthetic replacement of head of humerus
W519	Unspecified other prosthetic replacement of head of humerus
W521	Primary prosthetic replacement of articulation of bone using cement NEC
W528	Other specified prosthetic replacement of articulation of other bone using cement
W529	Unspecified prosthetic replacement of articulation of other bone using cement
W531	Primary prosthetic replacement of articulation of bone not using cement NEC
W538	Other specified prosthetic replacement of articulation of other bone not using cement
W539	Unspecified prosthetic replacement of articulation of other bone not using cement
W541	Primary prosthetic replacement of articulation of bone NEC
W548	Other specified other prosthetic replacement of articulation of other bone
W549	Unspecified other prosthetic replacement of articulation of other bone
W931	Primary hybrid prosthetic replacement of hip joint using cemented acetabular component
W938	Other specified hybrid prosthetic replacement of hip joint using cemented acetabular component
W939	Unspecified hybrid prosthetic replacement of hip joint using cemented acetabular component
W941	Primary hybrid prosthetic replacement of hip joint using cemented femoral component
W948	Other specified hybrid prosthetic replacement of hip joint using cemented femoral component
W949	Unspecified hybrid prosthetic replacement of hip joint using cemented femoral component
W958	Other specified hybrid prosthetic replacement of hip joint using cement
W959	Unspecified hybrid prosthetic replacement of hip joint using cement
W961	Primary total prosthetic replacement of shoulder joint using cement
W968	Other specified total prosthetic replacement of shoulder joint using cement
W969	Unspecified total prosthetic replacement of shoulder joint using cement
W971	Primary total prosthetic replacement of shoulder joint not using cement

OPCS4 code	Description
W978	Other specified total prosthetic replacement of shoulder joint not using cement
W979	Unspecified total prosthetic replacement of shoulder joint not using cement
W981	Primary total prosthetic replacement of shoulder joint NEC
W988	Other specified total prosthetic replacement of shoulder joint
W989	Unspecified total prosthetic replacement of shoulder joint